M. Guillemin, in an admirable paper on the metallography of the alloys of copper presented to the French "Commission des Méthodes d'essai des Matériaux de Construction,"[1] has given evidence that it is possible to pronounce with certainty, by the examination of etched surfaces of examples of the alloys, which deoxidiser has been employed.

It remains to be seen in what way the mechanical properties of steel are connected with the structural changes revealed by micrographic examination. In every specimen of steel, as has already been stated, at least three great molecular changes are produced as the metal is raised from the ordinary temperature to a white heat. The belief that the rearrangement of atoms in the molecule of iron (which is, in fact, allotropy) is really fundamental to these molecular changes, is rapidly gaining adherents, but authorities on hardening of steel are by no means in accord as to the true significance of allotropy in relation to that important industrial operation. The writer of this paper has long declared himself to be a pronounced allotropist, and many patient experimenters are hard at work at the problem. M. Charpy,[2] for instance, had already pointed to the peculiar behaviour of steel under longitudinal stress, as proof that the metal undergoes allotropic change. He now seeks, by an elaborate series of experiments, to ascertain whether the mechanical tests of steel which has been quenched at definite temperatures, support Osmond's view as to the significance of the part played by allotropy of iron in the hardening of steel. Charpy's opinion seems to be that, on the whole, his experiments do not afford conclusive evidence in support of Osmond's view. It may, however, be urged that in the case of steel, mechanical tests could not be expected to afford decisive evidence in relation to the theoretical significance of allotropy, because, as M. Osmond's micrographic work shows, the structure of steel is so complex and varies so much with thermal treatment. It is, of course, ultimate structure which determines the strength and elasticity of steel, and none of us claim that allotropy is the sole factor in the production of structure.

The magnetic behaviour of steel, on the other hand, as M. Curie has recently pointed out, is greatly influenced by temperature, for, within the range of 20° to 1350°, rapid variations in magnetic properties of soft iron reveal themselves at about 750°, 860°, and 1280°. This, as he says, is favourable to the views of M. Osmond, because on independent evidence we are led to conclude that at temperatures near these points the metal undergoes allotropic modifications.

It is to be hoped that microscopic analysis will soon take its place in the ordinary routine of every steel works laboratory, and it should be added that in this country two well-known authorities, Mr. T. Andrews and Mr. J. E. Stead, constantly employ it, while Mr. A. Sauveur[3] has originated the system already in the works of the Illinois Steel Company. W. C. ROBERTS-AUSTEN.

## *THE SCIENTIFIC RESULTS OF THE ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION.*

THE annual meeting of the British Medical Association is, no doubt, increasing in importance, since it is becoming a congress for the demonstration of the advance of medicine. The work of the meeting may be considered as belonging to two classes, the practical and the scientific. Many, no doubt, who attend the annual meeting, do so with the object of gaining practical help in both the medical and the surgical treatment of their patients; and this help the annual meeting gives in abundance. One of the most important parts of the meeting, however, is that which is occupied with the progress of scientific medicine, and consists not so much in the announcement of startling discoveries (for with these medicine has but little to do), but in the revision and criticism of the facts discovered by experiment and at the bedside.

Medical science is becoming more exact, as the knowledge of the functions of living tissues (physiology) and their changes in disease (pathology) increases.

It is not so many years ago when the chief subject in what was called physiology was histology, or the structure of the tissues. Physiology proper then rapidly progressed, and although at first it was considered from a somewhat too physical standpoint, and indeed is still so considered by some, yet it has received an enormous impetus by being associated with the study of chemistry and of the action of the chemical constituents of the body on the living tissues. This is evidenced in the excellent address on "Internal Secretion," given by Prof. E. A. Schäfer, F.R.S., of University College, a subject which in its scientific aspects is of a quite recent development. A secretory organ may, like the stomach, salivary glands, &c., separate materials from the blood and pour them into a cavity, in which they are utilised; this may be called external secretion. On the other hand, "some secreted materials are not poured out upon an external surface at all, but are returned to the blood"; these may be called internal secretions. Although it is probable that in the widest sense every tissue has an internal secretion, yet this is most obvious in the ductless glands, such as the thyroid, the suprarenal bodies, and the pituitary body. But in one gland with an important external secretion, viz. the pancreas, there is also an internal secretion which is of great value in the economy.

The subject of internal secretion has developed hand in hand with clinical medicine, and it was the observation of patients which first, as in the case of the thyroid, gave the clue to the line of investigation. It is impossible in this place to give a detailed account of Prof. Schäfer's address; it is well worthy of study by every one interested in the progress of biological science. It will not be out of place, however, to illustrate the subject of internal secretion by quoting as examples the investigation of the pancreas and the suprarenal capsules, the latter of which has been the subject of special study by Prof. Schäfer, in conjunction with Dr. G. Oliver and Mr. Moore.

The association of disease of the pancreas with the presence of sugar in the urine has long been noted; although only a certain proportion of cases of diabetes show any great changes in this organ. If the pancreatic juice be diverted from the intestine, or if the duct be blocked, the animal experimented upon does not die, there is no glycosuria, nor does it apparently suffer any great nutritional change. If, however, the pancreas be totally extirpated, glycosuria appears, and the animal invariably dies; this does not occur, however, if only a part of the organ be removed. More than this, if a portion of living pancreas be successfully grafted into an animal from which the organ is subsequently completely removed, no evil results follow. Besides its obvious and important function of secreting a digestive juice, the pancreas therefore produces some material which it gives to the blood, and which is essential for the continuance of life; this is the internal secretion. On the other hand, it is suggested that the organ nominally separates and transforms some toxic substance which is fatal to existence; this is the theory of auto-intoxication. The internal secretion of the suprarenal capsule is more obvious, perhaps, than that of the pancreas. The capsule is a ductless gland; it has no external secretion. The complete

[1] "Analyse Micrographique des Alliages." (*Comptes rendus*, vol. cxv. p. 232, July 25, 1892.)
[2] "Bull. de la Soc. d'Encouragement," vol. x. 1895, p. 660.
[3] "Trans. Amer. Soc. Mining Engineers," vol. xxii. p. 546.

removal of both suprarenal capsules results in rapid death, which is preceded by great muscular weakness, diminished tone of the vascular system, and some nervous symptoms; a combination of events which is seen in Addison's disease, which is a disease of these organs. From the medullary portion of the gland, Schäfer has obtained an extract containing an active substance which is remarkable as producing its effects in very small doses (as little as 5½ milligrams in a dog weighing 10 kilos.), and as being capable of withstanding for some time the temperature of boiling water. This substance increases the duration of the contraction of muscle, as tested by the apparatus ordinarily in use in the physiological laboratory; but it has a more remarkable effect in greatly increasing the blood pressure, a result following a direct action on the peripheral arteries. In the case of the suprarenal capsule, there is thus distinct evidence of internal secretion; that is, of the presence in one part of the gland of a substance which has a well-marked physiological effect. Into all the questions arising out of this subject it is impossible now to enter. The subject is one of vast importance to scientific practical medicine. As the results of future investigation, we may hope to obtain not only a greater knowledge of the pathology of some obscure nutritional diseases, but some indications for their relief and treatment. This has already been accomplished in the case of myxœdema, in which the thyroid gland is degenerated, and in which very great benefit is obtained by feeding the patients with fresh thyroid gland, or by injecting the extract.

One other scientific result of the annual meeting may be viewed. It is the predominant place now given in the study of disease to the question of infection. All disease is not infective, but infection, in theory, has for many decades played an important part in pathology. The great change which has come over medical science is, that the question of infection is now studied from an experimental point of view. Vague theories have given place to facts, which are of prime importance, not only in the understanding of disease, but in its treatment. In the investigation of diseased, as well as of normal functions, the application of chemical methods has been of great service, and is destined to be of still greater importance.

The accurate study of infection deals with a far wider subject than the characteristics of the infective agent; since it is also concerned with the reaction of the body against the micro-organism and the poisonous chemical substances this produces. The study of this reaction of body has, from the morphological point of view, given a clearer view of the processes occurring in inflammation; and from the chemical point of view, it has opened up a wide field of possible therapeutical agents. The prospect is one which is reassuring for the future. The fact that infection is being so closely studied, and that the infective agents in so many diseases have been isolated, is of great importance to the human race; since infection is preventible. The fact that the body, in reacting against an infective disease, produces a substance which counteracts invasion, as well as the poisonous bodies formed by the infective agent, is of as great importance as the first point; since an infective disease may be cured. At the annual meeting, the discussion on pneumonia as an infective disease—a discussion which would have been impossible, and would even have been considered ludicrous only a few years ago—as well as the discussion on the utility of the diphtheria anti-toxin, illustrates the points mentioned. In the discussion on diphtheria, the great majority of the speakers, both those who considered the subject from the scientific aspect and those who looked at it simply from the practical point of view, agreed that the use of the anti-toxin in the disease was not only based on a firm scientific basis, but that it had completely changed the aspect of the disease. Whatever the limitations of the treatment by anti-toxic serum may in the future be proved to be, there can be but little doubt that its discovery marks an epoch in the treatment of infective disease.

## *THE IPSWICH MEETING OF THE BRITISH ASSOCIATION.*

THE arrangements for the meeting of the British Association at Ipswich this autumn are making rapid progress. The General Election somewhat interrupted the preparations of the local secretaries, but the excitement being now over, general attention in the locality is again centred on the coming visit of the Association, and great efforts are being made in the town and neighbourhood to ensure the success of the meeting. The chief public buildings in the town are just emerging from the hands of the painter and decorator. The reception room will be located in the Town Hall, the council chamber being the room actually set apart for the purpose, whilst the library will be the writing room. The President's address and the evening discourses will be delivered in the public hall, as will also the lecture to working men. In the matter of Section rooms, the Local Committee will be able to offer the Association very good accommodation, as there are fortunately a number of suitable rooms and halls in the town within a very short distance of each other, and all are close to the reception room. The two halls at the Girls' High School, which were formerly the New Assembly Rooms, and were used for the reception room and for Section E on the occasion of the Ipswich meeting in 1851, will be allotted to Section A (Mathematical and Physical Science) and Section B (Chemistry). About two hundred yards distant is the Co-operative Hall, in which Section G (Mechanical Science) will meet. Section C (Geology) will be accommodated in the Art Gallery adjoining the Museum. Section D (Zoology) and the new Section K (Botany) will have, respectively, the banquet room and the lodge room at the Masonic Hall. The Lecture Hall, adjoining the Ipswich Institute, will be given over to Section E (Geography), whilst across the street, the Working Men's College (formerly known as the Old Assembly Rooms) will be set apart for Section H (Anthropology).

The proceedings will commence on the evening of Wednesday, September 11, when the Marquis of Salisbury will retire from the presidential chair, and Sir Douglas Galton will take his place. The new President will then proceed to deliver his address. The second evening will, as usual, be devoted to a conversazione, which will probably be held in the museum and the adjoining buildings, used as art and technical schools. On Friday evening Prof. Silvanus P. Thompson will deliver a lecture on "Magnetism in Rotation." On Monday evening Prof. Percy F. Frankland will discourse on "the work of Pasteur and its various developments," and on Tuesday there will be a soirée given by the Ipswich Scientific Society and the Suffolk Institute of Archæology jointly. This, like the first soirée, will probably be held in the Museum buildings. The lecture to working men will be given on the Saturday evening by Dr. Alfred H. Fison, who takes "Colour" for his subject.

In response to a special invitation which the Local Committee issued to foreign men of science, the following gentlemen have signified their intention of being present at the meeting:—Prof. A. Gobert (Brussels), Prof. W. E. Ritter (Heidelberg), Rev. T. Adams (Canada), M. J. Dantzenburg (Paris), Dr. O. Maas (Munich), M. Boule (Museum d'Histoire naturelle, Paris), Prof. Ira Remsen (Johns Hopkins University, U.S.A.), Prof. Runge (Hanover), Prof. E. C. Hansen (Copenhagen), Dr. van Rijckevorsel (Rotterdam), M. G. Dolfus (Paris), His Excellency Don Arturo de Marcoartu, M. E. van den Broeck